# New Jersey Department of Environmental Protection
# Division of Water Supply and Geoscience

# Water Quality Parameter Sampling Plan Guidance

**September 2016**

The Lead and Copper Rule (LCR) under the Federal Safe Drinking Water Act is applicable to public community and non-transient non-community water systems. The LCR requires Water Quality Parameters (WQP) be monitored to help public water systems and the New Jersey Department of Environmental Protection (DEP) determine whether a water supply is corrosive, identify appropriate corrosion control treatment options if needed, and determine whether corrosion control treatment is being properly operated and maintained following installation [40 CFR 141.87]. For most water systems that require treatment, corrosion control is the primary mechanism for reducing their lead and copper levels.

DEP is requiring all small and medium water systems (systems serving less than or equal to 50,000) that use corrosion control treatment (CCT) to conduct ongoing WQP monitoring after the installation of CCT. All large water systems (serving greater than 50,000) must conduct ongoing WQP monitoring once they are determined to be optimized per the LCR.

This document provides guidance on how to prepare an acceptable WQP Sampling Plan.

**Acknowledgements:** This document was prepared using various resources including EPA's Lead and Copper Rule Monitoring and Reporting Guidance for Public Water Systems (March 2010)

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# Section 1 – General Water System Information

Appropriately characterizing a system and understanding the sources of water, including treatment, are necessary to determine the appropriate water quality parameters (WQP) to be sampled at a water system's point of entry and throughout the distribution system.

The WQP Sampling Plan shall include:

- System name;
- New Jersey PWSID number;
- Contact information for the system owner and operator;
- Total number of service connections;
- Population served (excluding transient populations);
- Date plan was prepared (and revision date, if applicable);
- Name and contact information of the person who prepared/revised the plan;
- System type (GW, SW, GUDISW, SWP, GWP);
- List of sources including their facility ID (i.e. WL001002, IN001002, CC001002);
    - Identify if the source is regular/emergency/seasonal use. If seasonal, identify the seasonal operating period.
    - If the source is an interconnection, identify percentage of water received
- Contact information for bulk purchasers and wholesalers (including PWSID numbers);
- All installed treatment highlighting corrosion control treatment and the appropriate facility ID (e.g. Soda Ash Facility ID TP001001, Orthophosphate Facility ID TP002008);
    - If a corrosion inhibitor is installed and/or received from only a select number of entry points, identify if the inhibitor is isolated to a specific distribution system zone (i.e. pressure gradient) or if it extends throughout the entire distribution system.
    - Identify if the corrosion inhibitor has a secondary purpose (i.e. reduce levels of iron/manganese)
- Distribution system map that clearly identifies the following water system components:
    - Water source(s);
    - Interconnections;
    - Treatment plants (including booster stations);
    - Storage tanks;
    - Layout of distribution mains;
    - Water main materials;
    - Pressure zones;
    - Delineation of areas receiving corrosion control inhibitor;
    - Blow offs/flushing points;
    - Maximum residence time sites and/or areas of high water age.
    - Standard WQP sampling sites;
    - Reduced WQP sampling sites; and
    - Alternate WQP sampling sites;

*The distribution map may be stored as an electronic GIS map as long as it can be accessed and provided upon request.*

# Section 2 - WQPs to be Analyzed

WQP sampling may vary depending on whether initial, follow-up, or optimized monitoring is required. Additionally, alternate sources of water (e.g. emergency interconnections or wells) should be identified so the appropriate WQPs may be sampled if the source is needed for a prolonged period. Incorporate the appropriate WQPs to be analyzed based on which schedule type is applicable for your water system.

DEP may require monitoring of additional water quality parameters (i.e. iron, manganese, chloride, sulfate, etc.) if determined necessary for complete evaluation of corrosion control treatment processes.

## Initial WQP Monitoring

Water systems under the federal Lead and Copper Rule (LCR) are required to conduct initial WQP monitoring within six months from the beginning of the monitoring period in which the system exceeded the lead and/or copper action level. Any system that does not have lead and/or copper corrosion control treatment installed or has not been placed on follow-up monitoring by DEP, should include initial WQP monitoring requirements within its WQP sampling plan. During initial monitoring, the analysis of the following parameters is required:

- pH
- Alkalinity
- Calcium
- Conductivity
- Temperature
- Orthophosphate, when a phosphate-based corrosion inhibitor is used
- Silica, when a silicate-based corrosion inhibitor is used

It is strongly recommended that chloride, sulfate, iron, and manganese also be analyzed at each point of entry, permanent interconnection points, and distribution location(s). This will provide the system with additional water quality characteristics to assist in determining appropriate corrosion control treatment options.

## Follow-up WQP Monitoring

Water systems under the LCR are required to conduct follow-up WQP monitoring during 2 consecutive 6-month monitoring periods immediately following the installation of corrosion control treatment, beginning January 1$^{st}$ or July 1$^{st}$, whichever is sooner. During follow-up monitoring, analysis of the following parameters is required:

- pH
- Alkalinity in the distribution system, and at POEs (where alkalinity adjustment is used)
- Calcium, when calcium carbonate stabilization is used
- Orthophosphate, when a phosphate-based corrosion inhibitor is used
- Silica, when a silicate-based corrosion inhibitor is used.

Optimal WQP Monitoring

DEP sets optimum water quality parameter values following the completion of follow-up WQP monitoring. Within 30 days of completing follow-up WQP monitoring, a water system is required to submit an Optimal WQP Recommendation to DEP using form BWSE-LC03. After DEP sets optimum water quality parameter values, the water system under the LCR is then required to conduct optimal WQP monitoring beginning January 1st or July 1st, whichever is sooner. During optimal monitoring, the following parameters are required:

- pH
- Alkalinity, when alkalinity adjustment is used
- Calcium, when calcium carbonate stabilization is used
- Orthophosphate, when a phosphate-based corrosion inhibitor is used
- Silica, when a silicate-based corrosion inhibitor is used.

## Section 3 - Point of Entry Monitoring Schedules

Samples must be collected from each entry point to the distribution system, including all permanent active interconnections. Samples collected at the entry points to the distribution system shall be from locations representative of each source after treatment. If the system draws water from more than one source and the sources are combined before distribution, the system must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used). If only groundwater is being utilized, point of entry monitoring may be limited to representative sites with DEP's approval as per 40 C.F.R. 141.87(c)(3).

All point of entry samples are to be collected once every 14 days (bi-weekly) beginning January 1st or July 1st, whichever is sooner.

*The plan should also outline procedures for when samples may need to be taken from an emergency point of entry location, if used for an extended period of time.*

It should be noted that there may be situations when additional WQP sampling is required based on the dynamics of the water system (e.g. if, after leaving the point of entry, the treated water is blended with another source prior to entering the distribution system). This also includes booster stations where a corrosion control inhibitor is added.

## Section 4 – Tap (Distribution System) Monitoring Schedules

The number of sample sites utilized to sample throughout the distribution system is based upon the system's residential and non-transient population served (refer to Table 1 below). Sample sites in the distribution system must be representative of the water quality throughout the system.

Two WQP samples must be collected from each representative distribution site at different times in the monitoring period to that ensure water quality data is representative of seasonal changes that can take place during a monitoring period.

**Table 1**

| System size (Population Served) | No. of Standard Distribution Sites for WQPs | No. of Reduced Distribution Sites for WQPs |
|---|---|---|
| > 100,000 | 25 | 10 |
| 10,001-100,000 | 10 | 7 |
| 3,301 to 10,000 | 3 | 3 |
| 501 to 3,300 | 2 | 2 |
| ≤ 500 | 1 | 1 |

DEP may require additional distribution system sites to represent water quality more evenly throughout the distribution system (e.g. a system required to collect from 3 distribution system sites has 7 distinct pressure zones; in this case, 7 distribution system samples may be required).

Sites identified in a water system's Revised Total Coliform sampling plan may provide an adequate pool of WQP tap sample sites. Utilizing the same sites for both WQP and total coliform helps ensure that access is available, personnel are already in place to perform monitoring at these sites, and the locations are representative of the distribution system conditions as required by the Revised Total Coliform Rule.

The following items should be taken into consideration when selecting sample sites:

- Size of the population served and where the population is located;
- All of the different sources of water currently in use;
- All of the different treatments installed and operating;
- The effects of seasonal variability on treatment and water quality;
- The proximity of WQP sites to lead and copper tap water sampling sites;
- The proximity of WQP sites to supplemental chlorination feed points;
- The proximity of WQP sites to ground or elevated storage locations;
- That sampling sites are representative of typical retention times of water in the distribution system;
- That sampling sites are representative of distinct pressure zones located throughout the distribution system;
- That sampling sites are representative of distribution system materials;
- The sampling sites' proximity to seasonal sources of supply

Systems should avoid the following when selecting sample sites:

- Areas where maintenance or flushing is conducted to reduce the chance of water quality upsets
- Fire hydrants and storage tank taps
- Sampling sites where routine access is an issue as repeat sampling may be necessary following an excursion (e.g. schools, businesses with limited hours, residences).

Be sure to include the site specific justification for each tap sample site.

*The plan should also outline procedures for when samples may need to be taken from alternate and/or additional distribution sites, if an emergency source is used for an extended period of time.*

Reduced Distribution Monitoring

Systems on optimal monitoring may request reduced monitoring if the following criteria are met:

- If a system maintains the optimal water quality parameters during two consecutive 6-month monitoring periods and serves more than 10,000 persons, the system may reduce the number of distribution sampling sites (refer to Table 1 above), with approval from DEP.
- If a system maintains the optimal water quality parameters during three consecutive years of monitoring, the system may reduce sampling from every six months to annually, with approval from DEP. This sampling begins during the calendar year immediately following the end of the third consecutive year of six-month monitoring.
- If a system maintains the optimal water quality parameters during three consecutive years of annual monitoring, the system may reduce the sampling from annually to every three years. This sampling begins no later than the third calendar year following the end of the third consecutive year of annual monitoring.

## Section 5 – Sample Collection and Analysis

WQP samples may be collected and analyzed by a NJ certified laboratory or by an approved person (Licensed Operator or someone trained by a Licensed Operator). If the sample collection and analysis is being conducted by a certified laboratory, the plan may only include the name and contact information of the contracted laboratory. If the sample collection and/or analysis is being conducted by an approved person, the following items should be detailed in the plan, as applicable:

- Identification of primary and alternate sample collectors
- Established sample container preparation and transport procedures
- Established sample collection procedures
- Established sampling analysis procedures

Refer to the Office of Quality Assurance for standard procedures (http://www.nj.gov/dep/enforcement/oqa.html).

WQP samples should be collected as follows:

- Remove an aerator if present
- Fully flush the tap (for a minimum of 30 seconds)
- Collect and analyze sample for temperature and pH in the field
- Collect the samples for the other WQPs.

When collecting WQP samples, observations about color, suspended solids, and the flushing time required prior to achieving acceptable sampling conditions should be noted. During collection of the WQP samples, care should be taken to avoid the introduction of air bubbles into the sample which can affect the pH, conductivity, and dissolved oxygen content of the water sample.

Plastic or glass containers can be used when collecting WQP samples unless silica analysis is required, in which case, plastic must be used. All samples should be stored in a cool environment until analyzed. During transportation, care should be taken to avoid breakage of the sample.

## Section 6 – Action Plans

Action plans for Monitoring & Reporting (M&R), single excursions, and treatment technique (TT) violations are required (as applicable) in the plan. Action plans for single excursions and treatment technique violations are only required for systems on optimal monitoring. *A system should note that failure to complete specific action items may also result in additional violations, such as failure to submit a Corrosion Control/Source Water Treatment Recommendation, failure to install the approved Corrosion Control/Source Water Treatment within designated timeframe, and failure to implement public education requirements. These violations are also required to be reported to DEP and require issuance of public notification to consumers.*

If an M&R violation is incurred, the following is required:

- Report the violation to DEP within 48 hours of determining the noncompliance
- Deliver a tier 3 public notification to your customers
- Include a discussion of the violation in your CCR

If a single excursion is incurred, the system should outline steps to confirm, inspect, and adjust treatment units as necessary.

A TT violation is incurred when nine or more excursions take place within a 6-month monitoring period during optimal WQP monitoring. An excursion occurs when any daily value for a parameter is below the minimum value set by DEP. An excursion remains unresolved until the system collects a sample at the same location for the same WQP that meets the minimum value. Nine excursions are allowed as it will ensure that the WQPs are above the minimum at least 95% of the time during a 6-month compliance period.

If a TT violation is incurred, the following is required:

- Report the violation to DEP within 48 hours of determining the noncompliance
- Deliver a tier 2 public notification to your customers
- Include a discussion of the violation in your CCR
- Return to semi-annual WQP tap monitoring and lead and copper tap monitoring at the standard number of sites if you are on reduced monitoring

Systems incorporating initial WQP monitoring requirements should include a plan for submitting a corrosion control treatment recommendation following completion of initial WQP monitoring. Systems incorporating follow-up WQP monitoring requirements should include a plan for submitting recommended optimal WQP values to DEP following completion of follow-up WQP monitoring. Systems may refer to EPA's "Optimal Corrosion Control Treatment Evaluation Technical Recommendations for Primacy Agencies and Public Water Systems" for further guidance on these actions. *The WQP Sampling Plan may refer/direct the user to the system's Lead and Copper Sampling Plan for these items.*